



# The effect of endurance training on addicted women's level of alkaline phosphates who use methadone

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## Abstract

**Introduction:** Previous studies indicated that endurance exercise is effective to decrease or increase the levels of liver enzymes. The aim of this study was to determine the effect of endurance training on alkaline phosphates (ALP) enzyme in Iranian addicted women with methadone.

**Methods:** Thirty Iranian female addicted prisoners and thirty non-addicted encompassed the sampling. The mean of age, height, weight, %BF, body mass index (BMI), and  $\text{VO}_2\text{max}$  of experimental group was 33.8 years, 162.2 cm, 62.2 kg, 33.10, 24.22  $\text{kg/m}^2$  and 16.18  $\text{ml/kg}$  respectively. The case group was supposed to run with 65% HRmax for 2 weeks (3 sessions in a week and for 25 minutes), 65%-75% HRmax for 3 weeks (3 sessions in a week for 35 minutes) and 75%-85% HRmax for 3 weeks (3 sessions in a week for 40 minutes). The blood samples were collected in amount of 5 ml 48 hours before the first session and after the last session of the protocol. The history of heart and liver diseases or hepatitis was not reported in case group.

**Results:** The level of ALP between case and control group in post-test was not significant. The level of ALP in post-test in contrast with pre-test in both groups was increased but this was not statistically significant in case group ( $P > 0.05$ ).

**Conclusion:** According to the results, the level of ALP in post-test in experimental group did not change after endurance training. Therefore, the investigation of other factors such as having suitable diet habits, quitting smoking, increasing the period of training is recommended for these types of addicts.

**Keywords:** Alkaline phosphates, Liver, Methadone, endurance training

## Introduction

Addicted persons' low vitamin and mineral stores prevent inflammatory liver to provide bile and filtration and decrease the appetite (1). According to medical sports committee, it is better to do aerobics exercises in 5-7 sessions and for 45-60 minutes in a week. The intensity of exercise should be suitable. If the intensity of exercise is average, the risk of damages will be decreased. Average intensity (150-170 beats in a minute) is useful for amateurs and people who are more than 40 years old (2). High intensity exercises can damage some organs of the body including liver. High intensity exercise increases the level of liver enzymes like alkaline phosphatase (ALP) in the serum (3). Methadone is an industrial opiate which is used as morphine for decreasing the pain and for curing

addicts who use heroin. It is used in the form of tablets or syrup<sup>1</sup>). Using methadone increases the amount of liver enzymes in the serum, glucose, lipid, triglyceride, and acid uric. It decreases the plaque of blood and level of neutrophils (4). ALP is one of the liver enzymes which is found in the bile tubes of liver and the natural level of ALP is 65-306 unit in per liter of the serum. Damage of bile duct obstruction increases the level of ALP. Level of ALP more than 300% of its natural level in colostase disease and diseases which refer to bile tubes is very important. The level of ALP in heart diseases, pancreatic disease, hepatic diseases, muscular diseases, using alcohol, body damages and inflammatory is increased (5). The aim of this study was to determine the effect of endurance training on the level of ALP in Iranian addicted women



who used methadone.

## Methods

In this research, a digital scale (Saman scale) that had been made by Iran was used to measure weight and length. Cooper 12 minutes test was used to measure  $VO_2\text{max}$  and the addicted women with methadone were asked to run around the football pitch. A caliper with SAEHAN mark and SH5020 model which had been made in England was used to measure the percent of body fat so the under skin fat in the triceps, suprailiac skinfold, and thigh could be measured. Pollock-Jackson formula was used to determine the total percent of body fat. Beurer belt, made in Germany, was used to determine the maximum of heart rate. The amount of body mass index (BMI) was calculated by a standard formula.

The subjects of this research were 30 Iranian addicted women with methadone and 30 non-addicted women. Blood samples were collected from the subjects 48 hours before and after the first and last sessions of training. Finally, 5 cc blood samples were collected in specific tubes and were taken to the laboratory. The amount of ALP was measured by photometer, an automatic set, before and after the test. Other causes of abnormal liver enzymes such as liver diseases were excluded.

## Statistical analysis

Kolmogorov–Smirnov test was used to ensure the normal distribution of collected data. Independent *t* test was used to contrast the mean of variables between the two groups. Dependent *t* test was used to contrast the mean of variables in case group in pretest and posttest.

## Results

According to the results, the different level of ALP between the two groups in post-test was not statistically significant ( $P=0.06$ ). Also, the different level of ALP in case group in post-test was not statistically significant ( $P=0.15$ ). In addition, the different percent of body fat between the two groups in post-test was not statistically significant ( $P=0.21$ ). The percent of body fat increased in post-test for case group but the different percent of body fat in pre- and post-test was statistically significant ( $P=0.001$ ). It should

also be noted that different amount of  $VO_2\text{max}$  between the two groups in post-test was not statistically significant ( $P=0.48$ ). The different amount of  $VO_2\text{max}$  for case group in pre- and post-test was statistically significant ( $P=0.01$ ). Different amount of BMI between the two groups in pre- and post-test was not statistically significant ( $P=0.07$ ). The different amount of weight in case group in pre- and post-test was not statistically significant and also it was not significant when we compared the two groups ( $P=0.25$ ). It means that endurance training does not significantly affect the level of ALP in the serum and the level of ALP did not change in case group 48 hours after endurance training. The mean of case and control group and the standard deviation of age and length are presented in Table 1. The mean and standard deviation of the percent of BF, BMI, weight,  $VO_2\text{max}$ , and ALP are shown in Table 2.

## Discussion

According to the recent reports of the United Nations Organization, 220 million addicts live in the world (1). The number of Iranian addicted women is not estimated correctly. According to health ministry, the ratio of Iranian addicted women to men is 1 to 8 (6). According to the officials' reports, 50% of the women prisoners are arrested because of using and selling opiates (6). According to the previous studies, the side effects of using opiates on women are more than men (6). High intensity of addiction in women is cleared after using the opiate for 2 years but in men it is cleared after using the opiate for 8 years. Women have specific physical and psychological structures, so they cannot tolerate a large amount of opiate use and they cannot take it for a long time. They suffer from some diseases like HIV and hepatitis. According to addiction centers and civil organizations reports, more than

**Table 1.** Statistical indexes which relate to the general characteristics of the two groups

	Case group	Control group
Mean (cm)	162.2	158.8
Standard deviation	4.60	5.63
Mean (age)	33.8	32.8
Standard deviation	10.66	8.25

**Table 2.** Comparing the amount of %BF, BMI,  $VO_2\text{max}$ , weight, ALP of the two groups

Group	Evaluation	BMI (kg/m <sup>2</sup> )	$VO_2\text{max}$ (ml/kg/min)	%BF	Weight (kg)	ALP (U/L)
Case	Before training	24.22±4.82	16.18±7.14	33.10±1.65	62.2±13.71	173.6±28.93
	After training	23.62±4.04	23.19±8.06	35.64±1.48	60.6±11.50	196.6±22.32
Control	Before training	26.34±4.91	13.92±7.20	32.94±5.56	65.7±15.27	166.8 ±40.48
	After training	27.02±7.21	9.64±5.22	36.44±4.42	67.8±22.87	186.6±82.34

500 000-600 000 Iranian addicted women use industrial opiates (6). There are different kinds of ways to stop the addiction and the regular way is the use of methadone. It is used in many camps and prisons. Since 2011, 37 554 men prisoners and 699 women prisoners have been cured with methadone (7). Methadone has some advantages and disadvantages. One of its advantages is the prevention of diseases like HIV. It also has long effects and decreases the temptation of using other opiates. In addition, it is safer in the period of pregnancy and improves the social and family relationship. Their disadvantages are constipation, vomiting, unnatural menstruation, bile pain, sweating, decrease of women hormone liver damage, etc. (1). However, in this research, we tried to find out a way to decrease the harms of methadone on the liver by endurance exercises but our results rejected any associations.

In many researches, the effect of endurance and speedy exercises separately and collectively was indicated on professional and amateurs athletes, the sick and normal men and women's liver enzymes but not on the addicts or people who used methadone (8). Our research indicated that endurance training does not significantly decrease the level of liver enzymes in the serum. The period of this training program was not as long as the programs of the previous studies.

Noaks and Carter (8) studied the biochemical variables of 23 athletes who participated in ultra-marathon competition. Eighteen athletes did not have any experience of marathon competition. Therefore, the level of ALP was increased in amateurs more than the professional athletes. This finding is not compatible with our results. Time of blood sampling can be considered as a possible reason for this incompatibility. Wu et al (9) studied the level of ALP in men athletes after a 24-hour ultra-marathon. The level of ALP increased immediately after the competition and 2 days after the competition it reached to its basal level. The findings of this study are not also compatible with our results. Subjects' amount of weight is a reason of this incompatibility. If the amount of weight is more than the standard level, the amount of fat will increase. As we know, the extra fat should be analyzed through the lipolysis process in the liver. This process results in an increase of ALP level in the serum. Córdova et al (10) studied 14 professional volleyball players. In this study, the level of ALP increased after 30 days of competition. Due to the period of its protocol, it is likely that their results are not in line with our findings.

We concluded that, endurance training does not decrease the level of liver enzymes in the serum in addicted women. It is because of different risk factors such as using different amount of methadone, smoking between the training, using fat foods, duration of protocol, and different circles

of menstruation. Therefore, we suggest that future studies on addicted women who use fixed diets and unique protocol.

### Ethical issues

The study was approved by the institutional ethics committees of faculty of Human Science, Tehran Payamenoor University, Tehran, Iran, and all participants signed a written informed consent regarding participation in the research project.

### Authors' contributions

All authors equally contributed to the writing and revision of this paper.

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